NOx RECLAIM WORKING GROUP MEETING

MAY 13, 2021
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Agenda

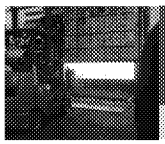
- Rulemaking Status on Landing Rules
- Bridge Concepts
- Incremental Cost-Effectiveness
- Ongoing Efforts and Next Steps

RULEMAKING STATUS ON LANDING RULES

Rules Under Development

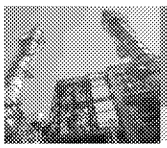
PR 1147.1 – Aggregate Facilities

Public Hearing: August 6, 2021



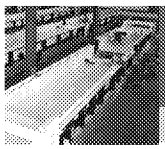
PR 1147.2 – Metal Melting and Heating Furnaces

Public Hearing: October 1, 2021



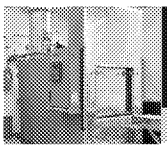
PR 1109.1 – Refinery Equipment

Public Hearing: September 3, 2021



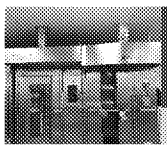
PR 1159.1 – Nitric Acid Processing Tanks

Public Hearing: November 5, 2021



PAR 1147 – Miscellaneous Combustion Sources

Public Hearing: December 3, 2021

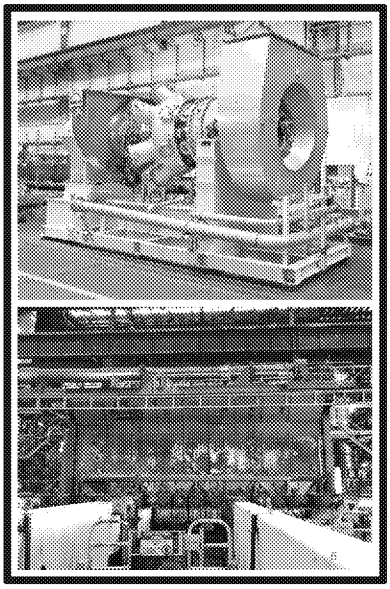


PAR 1153.1 – Commercial Food Ovens

Public Hearing: December 3, 2021

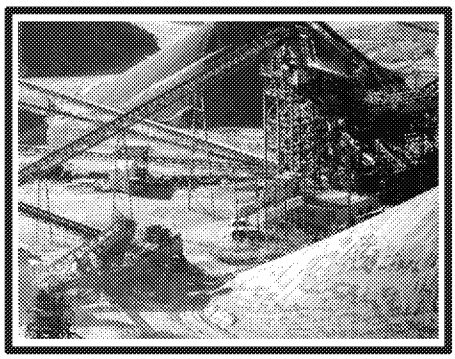
PAR 1147 – Miscellaneous Combustion Sources

- Previous Working Group Meeting held March 10, 2021
- Working with equipment vendors and burner manufacturers
- Cost-effectiveness analysis for remaining equipment categories anticipated to be presented at the next Working Group Meeting
- Next Working Group Meeting: May
- Public Hearing: December 3, 2021



PR 1147.1 – Aggregate Facilities

- Working Group Meeting held on April 29, 2021
- Staff met with industry representatives in April and May to discuss key remaining issues
- Proposed rule language will be released prior to the Public Workshop
- Public Workshop: May/June
- Public Hearing: August 6, 2021

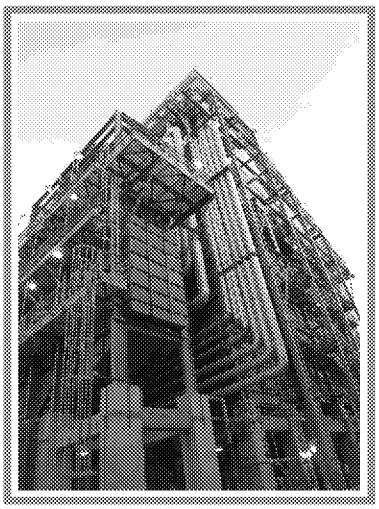


PR 1147.2 – Metal Melting and Heating Furnaces

- Working Group Meeting held on February 2, 2021
- Meeting with the California Metals Coalition and individual facilities to obtain more information
- Next Working Group Meeting: Late May
- Public Hearing: October 1, 2021

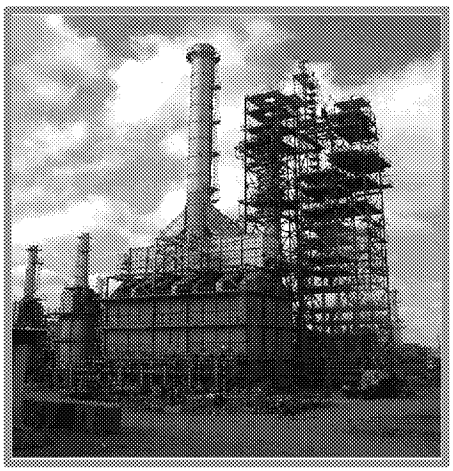
PR 1109.1 – Refinery Equipment

- Working Group Meeting held on April 30, 2021
- Norton Engineering review revised cost data
- Staff reassessing proposed BARCT limits, cost-effectiveness, and incremental cost-effectiveness for:
  - Heaters and boilers (>40 MMBtu/hr)
  - FCCU with existing SCRs
  - Vapor incinerators and thermal oxidizers
- Ongoing meetings to address issues and concerns from stakeholders
- Public Hearing: September 3, 2021



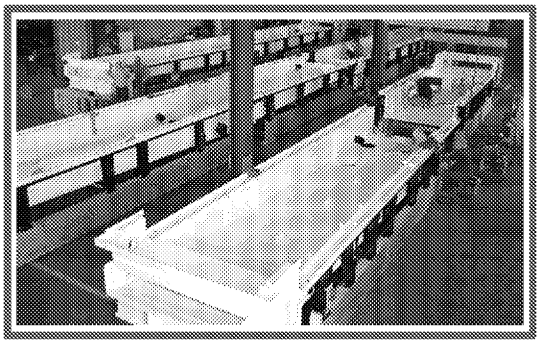
PR 429.1 – Start-up and Shutdown of Refinery Equipment

- Working Group Meeting held on April 30, 2021 with the PR 1109.1 Working Group
- Proposed rule language anticipated at next Working Group Meeting
- Meeting with stakeholders to address issues and concerns
- Public Hearing: September 3, 2021 (with PR 1109.1)



PR 1159.1 – Nitric Acid Processing Tanks

- Addresses NOx emissions from nitric acid processing tanks
- Staff in data gathering phase
- Public Hearing: November 5, 2021



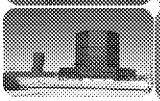
https://tri-mer.com/tanks/polypro-tanks-case-study.html

PAR 1153.1 – Commercial Food Ovens

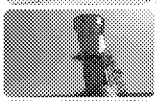
- Staff identified six RECLAIM facilities which operate food ovens, smokers, or dryers that will be subject to Proposed Amended Rule 1153.1
- Staff in data gathering phase
- Food ovens at RECLAIM facilities will become subject to the requirements of Proposed Amended Rule 1153.1
- Public Hearing: December 3, 2021

Adopted/Amended Rules for RECLAIM Transition and NOx Reductions

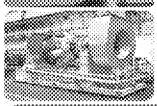
Rules 1146, 1146.1, 1146.2 – Boilers, Process Heaters, and Steam Generators	0.27



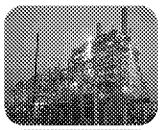
Rule 1118.1 – Non-Refinery Flares	0



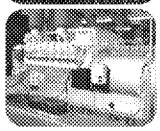
Rules 218, 218.2, 218.3 – Continuous Emissions Monitoring Systems	0



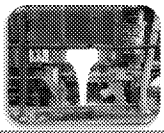
Rule 1134 – Gas Turbines	1.8



Rule 1135 – Electricity Generating Facilities	1.7



Rule 1110.2 – Gaseous- and Liquid-Fueled Engines	0.29



Rule 1117 – Container Glass Melting/Sodium Silicate Furnaces	0.57

Total NOx Reductions = 4.63 tons per day*

* Sum of NOx reductions from RECLAIM facilities only. Some NOx reductions may be attributed to the 2015 RECLAIM shave.

Landing Rules Staff is Revisiting

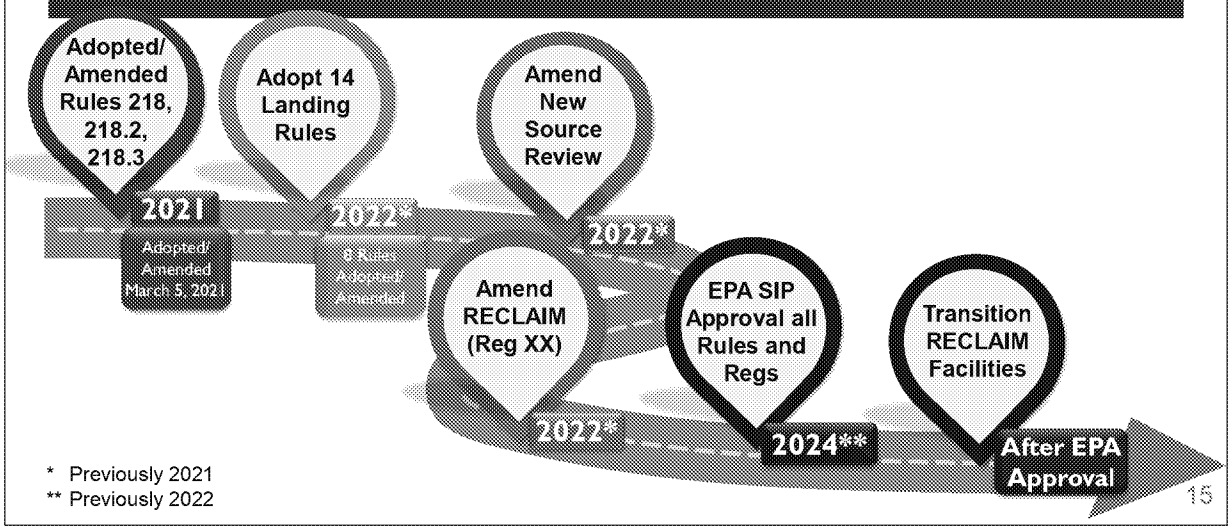
- Staff is proposing amendments for landing rules that have been adopted or amended to address:
  - Ammonia slip limits
  - Start-up and shutdown provisions
  - References to Rules 218.2 and 218.3 for CEMS
- The following rules are scheduled for amendments:
  - Proposed Amended Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines (August 2021)
  - Proposed Amended Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities (August 2021)
  - Proposed Amended Rule 429 – Start-up and Shutdown Exemption Provisions for Oxides of Nitrogen (Rule 1146 and 1134 units)
  - Proposed Rule 429.2 – Start-up and Shutdown Exemption Provisions for Oxides of Nitrogen (Rule 1135 units)

Updates to RECLAIM Transition Timeline

- Staff anticipates all landing rules to be adopted/amended by second quarter 2022[1]
- Regulations XIII and XX amendments are anticipated by fourth quarter 2022[1]
- Staff expects Regulation XIII, Regulation XX, and landing rules to be submitted to CARB and U.S. EPA at the end of 2022
- SIP approval of the three regulatory elements is expected in 2024
- Staff anticipates that facilities would transition out of RECLAIM no earlier than mid-2024
- Preferred approach is to stage facilities and transition all facilities from RECLAIM simultaneously
  - Staff will be discussing in future Working Group Meetings details regarding staging facilities for the transition out of RECLAIM

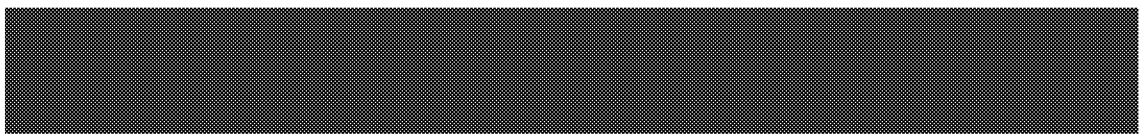
[1] Staff is updating Public Hearing dates for rules and regulations in the June Rule and Control Measure Forecast Report

Updated Overview of RECLAIM Transition



* Previously 2021
** Previously 2022

BRIDGE CONCEPTS



Background – Bridge Between RECLAIM and Command-and-Control

- Last Working Group Meeting staff discussed comments from U.S. EPA regarding interim requirements as facilities transition out of RECLAIM until the implementation of BARCT requirements in applicable landing rules
- Clean Air Act Section 110(l) prohibits U.S. EPA from approving a revision of a SIP if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress, or any other applicable requirement
- Since RECLAIM is SIP approved, U.S. EPA must ensure that the transition to command-and-control will not interfere with the South Coast AQMD's progress towards attainment

Three Key Components to Ensure the RECLAIM Transition Meets Section 110(l) of the Clean Air Act

Transition RECLAIM Facilities into a SIP Approved Program

- Ensures that RECLAIM facilities are transitioned into a SIP approved regulatory program
- Three regulatory elements that must be SIP approved:
  - All landing rules
  - Regulation XX
  - Regulation XIII

Demonstration that SIP Approved Reductions in RECLAIM Have Been Achieved

- Ensures SIP approved RECLAIM reductions have been achieved prior to transitioning facilities out of RECLAIM
- Must demonstrate that 12 tons per day (tpd) SIP approved reductions are achieved before transitioning facilities out of RECLAIM

Incorporate Enforceable Mechanisms in Landing Rules Until Full Implementation

- Ensures when RECLAIM cap is removed that status quo air quality is preserved
- Regulatory mechanism needed for rules with compliance dates after facilities transition out of RECLAIM

Demonstration that SIP Approved Reductions in RECLAIM Have Been Achieved

- At the September 2019 Working Group Meeting, staff discussed approach to ensure demonstration of NOx reductions of 12 tons per day (tpd) before transitioning facilities out of RECLAIM
  - Presenting the approach for informational purposes only – not recommending any changes
- Background
  - On December 4, 2015, Board adopted NOx RECLAIM amendments
    - Amendments resulted in a phased reduction of NOx allocations beginning in 2016 and continuing through 2022
    - Overall NOx reductions will be 12 tons per day (tpd) when fully implemented in 2022 and beyond
  - Federal CAA 110(l) requires an equivalency demonstration of this SIP commitment for RECLAIM to achieve the 12 tpd NOx shave
    - 14.5 tpd NOx emissions remain in RECLAIM after the shave is fully implemented

Approach for Federal CAA 110(l) Equivalency Demonstration

- Based on discussions with U.S. EPA, staff is recommending a one-time, programmatic equivalency demonstration as part of the SIP submittal package for the RECLAIM transition
- Actual emissions from RECLAIM facilities would be compared to the 14.5 tpd at time of SIP submittal of the three regulatory all rules
  - Regulation XX – RECLAIM
  - Landing Rules
  - Regulation XIII – New Source Review
- If actual emissions > 14.5 tpd:
  - Projection of actual emissions will be made to reflect implementation of landing rules with future effective dates
  - Projection will indicate when emissions will be below 14.5 tpd

Incorporate Enforceable Mechanisms in Landing Rules Until Full Implementation

- U.S. EPA has commented sources that have compliance dates after facilities exit RECLAIM will need an enforceable regulatory mechanism to ensure emissions do not increase
- Enforceable regulatory mechanism must at a minimum ensure that status quo air quality is preserved
- U.S. EPA suggests that staff incorporate interim emission limits for all equipment that have compliance dates after the facility transitions out of RECLAIM
- Staff anticipates that facilities will be ready to exit RECLAIM no earlier than 2024

Initial Concept

- Incorporate interim limits in landing rules for units with implementations after January 2024
- Interim limits would only apply to:
  - Equipment at former RECLAIM facilities; AND
  - Equipment with compliance dates after the facility exits RECLAIM
- U.S. EPA recommends that concentration limits be incorporated as interim limits as opposed to facility emission limits

Examples – Assuming RECLAIM ends in 2025

- Example 1 – Interim Limit Required
  Facility operating gas turbine with implementation date of 2027 in Rule 1134 – Interim limit needed
- Example 2 – Interim Limit Not Required
  Facility operating boiler with implementation date of 2024 in Rule 1146 – No interim limit needed

Guiding Principles for Establishing Interim Limits

- Interim limits would reflect current operating conditions until BARCT emission limits are achieved and are to maintain status quo air quality
- Interim limits are not an interim step down to BARCT emission limits
  - No additional emission reductions from interim limits
  - Designed to ensure no backsliding under Clean Air Act Section 110(1)
- Interim limits will apply to individual units
- Interim limits will be incorporated in landing rules for units that have compliance dates after January 1, 2024

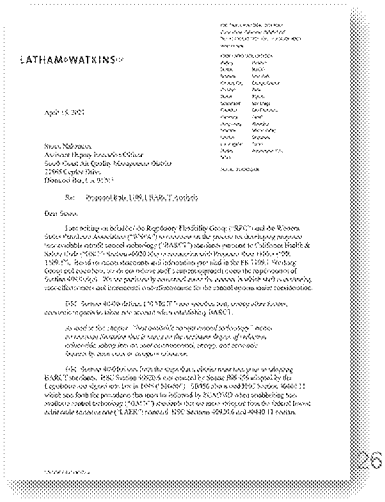
General Approach for Establishing Interim Limits

- Staff use the following information to establish interim limits:
  - Current permit limits
  - Default emission factors used for annual emissions reporting
  - Actual emissions
- Based on the information obtained, staff will establish the interim limit based on the most inclusive value
  - If the equipment category has a lot of variation, multiple interim limits for that equipment category may be established

INCREMENTAL COST-EFFECTIVENESS

Comment Letter on Cost-Effectiveness and Incremental Cost-Effectiveness

- Latham and Watkins on behalf of the Regulatory Flexibility Group and the Western States Petroleum Association submitted a comment letter on cost-effectiveness and incremental cost-effectiveness when establishing BARCT
- Concerned about the manner in which staff is evaluating cost-effectiveness and incremental cost-effectiveness for the control options under consideration
- Does not believe staff's current approach meets the requirements of Section 40920.6(a)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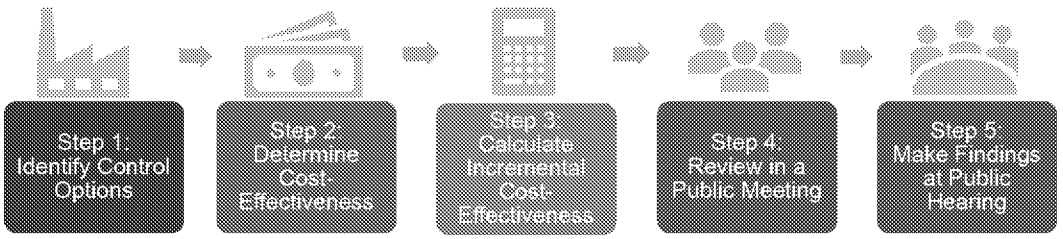
Incremental Cost-Effectiveness

- Health and Safety Code 40920.6 establishes the steps in assessing cost-effectiveness and incremental cost-effectiveness prior to adopting a BARCT standard
- Presentation focuses on Steps 1, 2, and 3
- Staff will continue to provide a discussion of incremental cost-effectiveness in the Draft Staff Report and at a public meeting consistent with state law (Steps 4 and 5)



Step 1: Identify Control Options

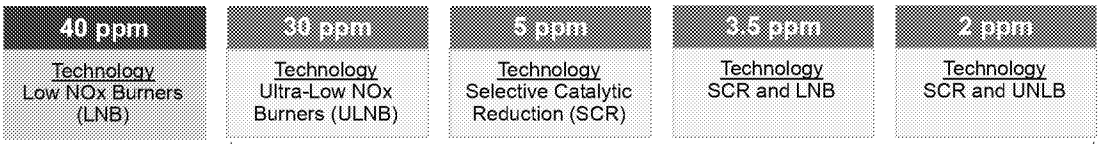
- **Step 1: Identify one or more potential control options which achieves the emission reduction objectives for the regulation**
- For landing rules, the "emission reduction objectives" is to establish a NOx emission limit representative of Best Available Retrofit Control Technology (BARCT)
- Staff conducts a technology assessment to identify potential NOx emission limits or "potential control options" that represent the "maximum degree of reductions achievable" consistent with BARCT

BARCT means an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source[2]

[1] Health and Safety Code §40920.6 (a)(1)
[2] Health and Safety Code §40406

Step 1: Identify Control Options - Example

- Based on the technology assessment, five possible NOx limits are identified based on different control technologies or combination of technologies
- The 40 ppm NOx limit is eliminated because it does not represent the maximum degree of reductions achievable and many units are already achieving 40 ppm
- BARCT analysis will proceed with four control options: 30 ppm, 5 ppm, 3.5 ppm, and 2 ppm
- Staff may return to consider 40 ppm if the control options that achieve the emission reduction objectives are not cost-effective

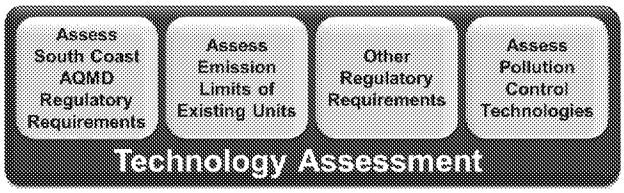


40 ppm does not represent maximum degree of reductions

Four control options that achieve the emission reduction objectives for the regulation

Discussion of Step 1

- Staff conducts a technology assessment as part of the BARCT analysis to identify potential control options
- Staff eliminates options that do not meet the objective of the rule which is to establish a NOx emission limit that meets BARCT
- In general options that do not represent "maximum degree of reduction achievable" are excluded from further analysis
- In the example, staff eliminated the 40 ppm NOx limit as it was not representative of BARCT



Step 2: Determine Cost-Effectiveness

- **Step 2:**
  - **Review the information developed to assess the cost-effectiveness of the potential control option**
  - **"Cost-effectiveness" means the cost, in dollars, of the potential control option divided by emission reduction potential, in tons, of the potential control option**
- Staff interprets "the potential control option" as the option that will provide the "maximum degree of reduction achievable" consistent with the definition of BARCT
- If the potential control option that will provide the maximum degree of reduction achievable is >$50,000/ton of NOx reduced[2], the next most stringent option is selected as the potential control option
- Staff collects published data, vendor quotes, facility costs, and other information to estimate costs and emission reductions

$$Cost\text{-}Effectiveness = \frac{Cost}{Emission\ Reductions}$$

[1] Health and Safety Code §40920.6 (a)(2)

Step 2: Determine Cost-Effectiveness - Example

- Calculate cost-effectiveness for the most stringent control option of 2 ppm – potential control option with the maximum emission reductions
- Since the cost-effectiveness for the 2 ppm potential control option is $52,600 per ton of NOx reduced, cost-effectiveness of next most stringent control option of 3.5 ppm is calculated
- Since cost-effectiveness of 3.5 ppm is < $50,000 per ton of NOx reduced, staff does not calculate the cost-effectiveness of other control options

Not cost-effective

30 ppm (ULNB)	5 ppm (SCR)	3.5 ppm (SCR+LNB)	2 ppm (SCR+ULNB)
		Reductions: 9,200 tons Cost: $455 Million Cost-Effectiveness: $49,500 per ton of NOx reduced	Reductions: 9,600 tons Cost: $505 Million Cost-Effectiveness: $52,600 per ton of NOx reduced

Discussion of Step 2

- Comment letter suggests that staff should evaluate the cost-effectiveness of all control options
- Staff disagrees with the comment as the Health and Safety Code requires that the cost-effectiveness be conducted on the "potential control option" which is singular
- Starting with the most stringent potential control option is consistent with the definition of BARCT which seeks the "maximum degree of reduction achievable"

Step 3: Calculate Incremental Cost-Effectiveness

- **Step 3:**
  - **Calculate the incremental cost-effectiveness for the potential control options identified in Step 1**
  - **Incremental cost-effectiveness is the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option**

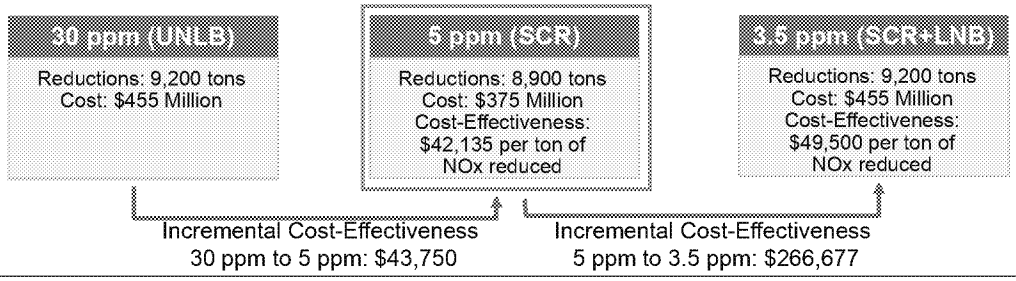
$$Incremental\ Cost\text{-}Effectiveness = \frac{Cost_{\blacksquare} - Cost_{\blacksquare}}{Emission\ Reductions_{\blacksquare} - Emission\ Reductions_{\blacksquare}}$$

- This step requires that the incremental cost-effectiveness be calculated for all potential control options identified in Step1, even if the cost-effectiveness was not evaluated in Step 2
- Evaluation of the incremental cost-effectiveness can identify a different NOx limit than Step 2 if the difference in reductions is small relative to the difference in cost between potential control options

[1] Health and Safety Code §40920.6 (a)(3)

Step 3: Calculate Incremental Cost-Effectiveness - Example

- Incremental cost-effectiveness for 30 ppm and 5 ppm: ~$43,750 per ton of NOx reduced
- Incremental cost-effectiveness for 5 ppm and 3.5 ppm: ~$266,677 per ton of NOx reduced
- 5 ppm would be selected because:
  - Control option of 5 ppm would achieve 95% of the reductions than the 3.5 ppm control option
  - Additional reductions from the 3.5 ppm control option provides about 8 percent more reductions at 21 percent higher cost
- In this scenario, staff would likely select 5 ppm as the proposed NOx limit



Industry Comments on Step 3

Calculate Cost-Effectiveness of All Potential Options

- Must conduct cost-effectiveness of all of the potential control options in Step 2 in order to conduct the incremental cost-effectiveness

Timing of Conducting Incremental Cost-Effectiveness for BARCT Assessment

- The incremental cost-effectiveness is a critical step in determining the BARCT level
- Incremental cost-effectiveness should not be conducted after the BARCT assessment is complete
- Conducting incremental cost-effectiveness after the BARCT level is established cannot inform the BARCT level

Purpose of Incremental Cost-Effectiveness

- Purpose of the incremental cost-effectiveness analysis is to determine whether BARCT must be set at a level that is less stringent than the most stringent cost-effective control option
- Staff should not use the incremental cost-effectiveness analysis as a check to demonstrate the NOx limits represents the maximum degree of reduction

Staff Response on Step 3

Comment: Calculate Cost-Effectiveness of All Potential Options

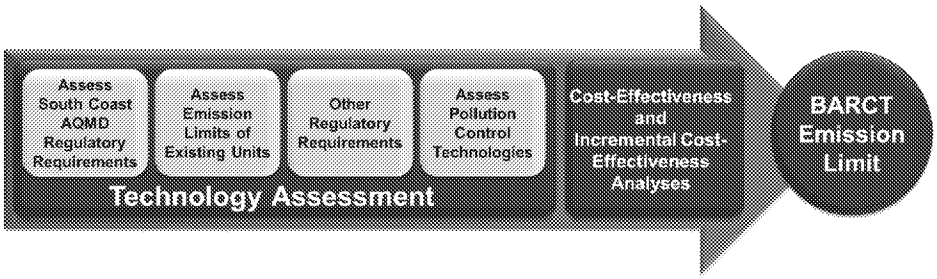
- Staff disagrees that the cost-effectiveness needs to be calculated for each control option
  - The incremental cost-effectiveness can be calculated in Step 3 without calculating the cost-effectiveness of each control option in Step 2
- The incremental cost-effectiveness is not the difference between the cost-effectiveness of each control option

$$Incremental\ Cost\text{-}Effectiveness = \frac{Cost_{[redacted]} - Cost_{[redacted]}}{Emission\ Reductions_{[redacted]} - Emission\ Reductions_{[redacted]}}$$

Staff Response on Step 3 *(Continued)*

Comment: Timing of Conducting Incremental Cost-Effectiveness for BARCT Assessment

- Staff agrees that the incremental cost-effectiveness is a critical step in establishing BARCT
- Staff will modify the BARCT analysis to better integrate the incremental cost-effectiveness analysis as part of the BARCT analysis



Staff Response on Step 3 *(Continued)*

Comment: Purpose of Incremental Cost-Effectiveness

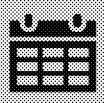
- Staff agrees that the incremental cost-effectiveness analysis is to determine whether BARCT must be set at a level that is less stringent than the most stringent cost-effective control option
- If the incremental cost-effectiveness reveal that a more stringent control option has high incremental cost-effectiveness, a less stringent NOx limit can be determined BARCT
- Although there is no threshold for evaluating incremental cost-effectiveness, staff agrees that a lower NOx limit with an incremental cost-effectiveness well above $50,000 per ton of NOx reduced is an indication that the more stringent control option is not incrementally cost-effective
- Staff will better characterize how incremental cost-effectiveness is used in determining a BARCT emission limit

Ongoing Efforts and Next Steps

Continue rulemaking activities

Continue working with U.S. EPA, CARB, and stakeholders

Monthly RECLAIM and Regulation XIII NSR Working Group Meetings



Quarterly Stationary Source Committee updates

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